DOCUMENT RESUME

ED 030 141 CG 003 131

By-Rock, Donald A.

Student Characteristics as Moderators Within Curriculum.

American Psychological Association, Washington, D.C.
Pub Date Sep 68
Note-12p.; Paper presented at the American Psychological Association Convention, San Francisco, California, August 30--September 3, 1968.
EDRS Price MF-$0.25 HC-$0.70
Descriptors-*Academic Achievement, Cocurricular Activities, Curriculum, *High School Students, Parent Influence, *Prediction, *Statistical Analysis, *Student Characteristics

A generalization of the moderated regression system was applied to obtain information concerning the interactions between groups of high school students and their attributes when predicting a criterion of success within a curriculum. Groups whose success within a curriculum exceeds that expected from the normal prediction equations, were identified. Participants were 403 students in the academic curriculum, 166 students in the business curriculum, and 137 students in the general curriculum. Rank in the senior class, independent of curriculum, was compared with seventh grade Sequential Test of Educational Progress math, science, social studies, reading, and writing scores. The potential moderators were: (1) the number of semesters of math, (2) father's feelings about post high school education, and (5) the extra-curricular activity level. Father's education level, and parental encouragement were positively related to prediction, parental encouragement for post high school education, and a high level of extra curricular activity were also related. The one characteristic finding throughout was that an indifferent or negative parental attitude led to underachievement. (PS)

ED030141

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

Student Characteristics as Moderators Within Curriculum[1]

Donald A. Rock

The scientific study of any prediction area within the behavioral sciences should ideally include a gain in the understanding of the psychological dynamics involved in the particular situation in addition to simply yielding functional relationships with increased predictive power. This two-fold objective appears to be particularly important to guidance or counseling decisions. There are a number of questions yet to be answered in this area, not the least of which are:

(1) Within any one curriculum are there types or classes of individuals who can be predicted with greater accuracy than others and

(2) Are there multiple paths to success (or failure) within the respective curriculum choice? That is, are the attributes necessary for success within a curricular choice invariant across those individuals within that field? Is it not unlikely that different people within the same curriculum areas may achieve the same high level of success yet have a different pattern of attributes independent of their respective levels?

The specific objectives of the research reported here (1) to apply a generalization of the moderated regression system in an effort to get at some tentative answers to questions concerning interactions between groups of individuals and their attributes when predicting a criterion of success within a curriculum: and (2) to identify and describe groups of individuals whose success within a curriculum exceeds that which one would expect from using the normal prediction equations.

Thus, one may be able to find and describe, in psychological terms, types of individuals (within any one curriculum area) who (1) either require different attributes for success or (2) have differing patterns of the same attributes, yet achieve the same level of success.

SP 003 137

---

[1]Paper presented at the American Psychological Convention, San Francisco, September, 1968.

Method

The generalized moderated regression iteratively forms homogeneous groupings of individuals on single and then multiple moderators and then selects that subset of moderators which maximizes any one of three objective functions having to do with predictor-criterion relationships. Which objective function is used is, of course, a function of the experimenter's goals. In this particular study two of the three objective functions were utilized. The first objective function used attempts to define those groups which are characterized by differential predictive accuracy. That is, what kinds of profiles on biographical items lead to homogeneous groupings of individuals who are extremely predictable or conversely extremely unpredictable within their respective curriculum. The second objective function utilized yields groups characterized by similar profiles in background variables but which also are characterized by differential levels of achievement which, in turn, were not expected from their predictor or input scores.

The sample was drawn from four high schools from an urban area. Three curricula were examined separately; these included 403 students in the academic curriculum, 166 students in the business curriculum, and 137 students in the general curriculum. The dependent variable was rank in senior class independent of curriculum. The independent variables were seventh grade step math, science, social studies, reading and writing. The potential moderators or grouping variables were four items and one scale from the 11th grade Biographical and Experience Questionnaire. The first moderator was a five choice item having to do with the number of semesters of mathematics the student had taken. The second moderator had to do with the educational level of the student's father. The third moderator had to

do with parental encouragement with respect to their school work. The fourth moderator was an item which inquired how the father felt about the student continuing education beyond high school. The last grouping variable was an individuals mean score on eight items describing the extent of their participation in extra-curricular activities such as club meetings, church social meetings, athletic events, dances, etc. Since the groupings were formed within curriculum and as a result the ratio of parameters to be estimated to sample size was relatively small it became impractical to divide each curriculum into a validation and cross-validation sample. The somewhat more rigorous criteria of validity generalization was attempted in lieu of forming hold out samples. That is, it was hoped that the selected moderator and predictor-criterion relationships would replicate across curricula. Then, those relationships which were unique to only one curriculum would provide input for future hypothesis testing.

Results and Discussion

Tables one, two and three deal with the questions of the possibility of identifying types or classes of individuals who are characterized by differential predictive accuracy. Table 1 indicates the predictive accuracy for various subgroups within the academic curriculum. When the individuals within the academic curriculum are grouped on father's education those individuals whose fathers were highly educated (college degree or more) were extremely predictable. Approximately 20% more of the criterion variance could be accounted for these individuals than for the total sample. It is also interesting to note that the least predictable (when father's education is used as a moderator)are those individuals whose father was essentially a college dropout.

When moderator three, parental encouragement, was used, a linear relationship was found between the validity coefficient and the moderator responses. That is, the greater the parental encouragement the more predictable were the individuals. The fifth moderator was extra-curricular activities and the most predictable group here was characterized by a relatively high activity level.

When groups were formed on responses to both moderators two and three simultaneously a very interesting pattern emerged. The most predictable group once again were those individuals who are characterized by both a high level of factors education and parental encouragement. However, the next most predictable group were those individuals whose father had for the most part only completed high school, yet there was an extremely significant amount of parental encouragement with regard to achievement in school. This second order interaction between the predictive validity and fathers education and parental encouragement suggests that predictors such as achievement tests have considerable predictive accuracy when the home environment is characterized by motivation for school achievement.

Tables two and three indicate that only one moderator, moderator five, (the general extra-curricular activity level) yielded subgroups having greater predictive accuracy than the overall group. Although the increases were modest for this particular moderator they are replicated across all three curricula. That is, those groups which are in general characterized by a relatively high activity level, regardless of curriculum, are more predictable than the remainder of the sample. It is also interesting to note that we once again have a linear relationship between the moderator (activity level) and predictive accuracy. That is, for those individuals characterized by high activity level the greater confidence we may have in

predictions of their school achievement. An attempt was then made to incorporate the three moderators as both linear terms and also as bi-linear cross-products with each of the predictors in one regression equation. This would enable the experimenter to keep his sample intact yet possibly yield better overall prediction than the commonly used linear regression surface. Unfortunately, with the exception of the general curriculum the use of non-linear regression surfaces incorporating the moderator variables added nothing to the overall predictive accuracy. However, within the general curriculum the introduction of the moderator activity level as both a linear term and also as a cross-product with the writing test did add three correlation points to the overall multiple-R. This was a statistically significant increase but of little practical importance. This has been a consistent finding in our recent work, i.e., the grouping approach of the generalized moderated regression technique leads to more satisfactory results than the non-linear regression surface model.

Table 4 is concerned with differential success within the academic curriculum. The moderators are selected here on the basis of maximizing between group variance of the residuals. Thus, the group descriptive characteristics, i.e., the so-called moderators describe groups in which the members either achieve better or worse than would be expected from their 7th grade step scores. The two moderators that maximized the previously mentioned objective function were an item inquiring about the father's attitude toward continuing on to post-high school educational training and the item on general activity level.

In general, the results in table 4 indicate that those individuals who come from an environment where the father encourages them to continue their post-high school education do better than one would expect

from their past achievement. This phenomena becomes quite apparent in group three where the mean residual (-11.81) is considerably below that of the other two groups. Of course, before any test of the difference between these mean residuals could be attempted the assumptions of analysis of covariance would have to be first tested.

Tables V and VI differential success within the business and the general curriculum respectively yield similar yet somewhat complex relationships. One consistent finding which occurs in both these curricula is that those individuals who come from backgrounds with little or no parental encouragement with respect to their school achievement do considerably less well than would be expected from their test inputs (see group 5 in table 5 and group 3 in table 6). Another finding that seems to replicate across these two curricula is that those individuals who come from backgrounds characterized by extremely high parental encouragement but who also have a relatively low activity level (group 3 in the business curriculum and group 1 within the general curriculum) appear to also do less well than expected. Conversely, those individuals who describe their home environment as average with respect to parental encouragement do better than expected. The one characteristic finding which occurs throughout regardless of curriculum is that indifferent or negative parental attitude commonly described in the literature as family press will lead to underachievement in this particular school system.

An interesting finding which has been consistently replicated in our recent moderator studies is that the same predictors seem to work best regardless of the moderators or groupings. However, although the writing test seems to be the best predictor regardless of the groupings, there is

considerable differential validity depending on the group in which it is being used. The suggestion here is that rather than giving the same battery to all individuals and interpreting the resulting predictions with more or less confidences in light of the background characteristics of the individual in question, one might also examine other potential predictors for these unpredictable individuals.

Table I

Moderated Prediction Within the

Academic Curriculum

Moderator 2 (Father's Education)

	Most Predictable Group	Least Predictable Group	Overall Group
N	86	74	403
Moderator $\bar{X}$	5.383	4.000	3.298
R	787	549	622
Predictors	Writing & Social Studies	Reading, Math, Soc. Stud.	Writing & S.S.

Moderator 3 (Parental Encouragement)[1]

	Most Predictable	Second Most Predictable	Least Predictable
N	206	146	42
Moderator $\bar{X}$	1.0	2.0	3.0
R	706	588	482
Predictors	Writing, Reading, Math	Writing, Soc. Stud.	Writing, Reading, SS, Math

Moderator 5 (Extra-Curricular Activities)[2]

	Most Predictable	Second Most Predictable	Least Predictable
N	134	62	207
Moderator $\bar{X}$	2.153	1.150	1.613
R	698	639	593
Predictors	Writing, SS, Math	Writing, Math	SS, Writing, Reading

Moderator 2 & 3 (Father's Education and Parental Encouragement)

	Most Predictable	Second Most Predictable	Least Predictable
N	86	89	165
Moderator $\bar{X}$	5.384, 1.384	2.618, 1.000	2.309, 2.255
R	787	706	524
Predictors	Writing, Soc. Stud	Writing, Math	Writing, Soc. Stud.

[1] Overall Moderator 3 Mean = 1.630

[2] Overall Moderator 5 Mean = 1.721

Table II

Moderated Prediction Within

The Business Curriculum

Moderator 5 (Extra-Curricular Activities)

	Most Predictable Group	Least Predictable Group	Overall Group
N	62	104	166
Moderator $\overline{X}$	2.127	1.538	1.757
R	634	533	553
Predictors	Writing, Science	Writing, Math, -Soc. Stud.	Writing, Math

Table III

Moderated Prediction Within

The General Curriculum

Moderator 5 (Extra-Curricular Activities)[1]

	Most Predictable	Next Most Predictable	Least Predictable
N	36	67	34
Moderator $\overline{X}$	2.219	1.616	1.129
R	.703	683	651
Predictors	Writing, -Reading, SS	Writing, -Reading, Science, Social Studies	Reading, Writing, -SS

[1]Overall R = .622 Moderator $\overline{X}$ = 1.647

Table IV

Donald A. Rock (ETS)

Differential Success Within the

Academic Curriculum

Moderators 4 & 5 (Fathers Encouragement Towards Higher Ed. and Activity Level)

	G_1	G_2	G_3
N	253	113	37
R	58	72	61
Moderator $\bar{X}$	1.1, 1.5	1.0, 2.2	3.2, 1.7
Mean Residuals	1.08	1.44	-11.8
Predictors	Writ, SS	Writ, Math, SS	SS, Writ

Table V

Differential Success Within the

Business Curriculum

Moderators 3 & 5 (Parental Encouragement and General Activity)

	G_1	G_2	G_3	G_4	G_5
N	64	30	41	24	7
R	53	71	47	85	92
Moderator $\bar{X}$	2.0, 1.7	1.0, 2.2	1.0, 1.6	3.0, 1.7	4.0, 1.6
Mean Residual	1.0	1.9	-2.9	3.8	-12.5
Predictors	Writ, Math	Writ, Read	Writ, SS, Read	Writ, Science	Writ, Read, SS

Table VI

Donald A. Rock (ETS)

Differential Success Within the

General Curriculum

Moderators 3 & 5 (Parental Encouragement and General Activity Level)

	G_1	G_2	G_3	G_4
N	46	51	12	28
R	37	69	70	
Moderator $\bar{X}$	1.0, 1.8	2.0, 1.6	4.3, 1.5	3.0, 1.5
Mean Residuals	-6.5	5.3	-7.1	4.2
Predictors	Writ.	Writ.	Writ.	Reading, Science